DRAFT

The Use of Neckdowns In Street Design

Transportation Planning Department
Boston Redevelopment Authority
May, 1977

CONTENTS

		PAGE
I.	INTRODUCTION	1
II.	CONDITIONS FOR USE	2
III.	NECKDOWN APPLICATIONS	5
IV.	BOSTON'S NECKDOWN PROGRAM	9

ILLUSTRATIONS

FIGURE		FOLLOWING PAGE
1	TYPICAL NECKDOWN	INTRODUCTION
2	SYSTEMATIC USE OF NECKDOWNS	4
3	NECKDOWNS ON BOTH STREETS	6
4	NECKDOWNS ONLY ON SIDE STREET	6
5	NECKDOWNS WITH NEAR-SIDED BUS STOP	7
6	NECKDOWNS WITH FAR-SIDED BUS STOP	7
7	NECKDOWNS WITH NEAR-SIDED AND FAR-SIDED BUS STOPS	7
8	NECKDOWNS AT MIDBLOCK	8

INTRODUCTION

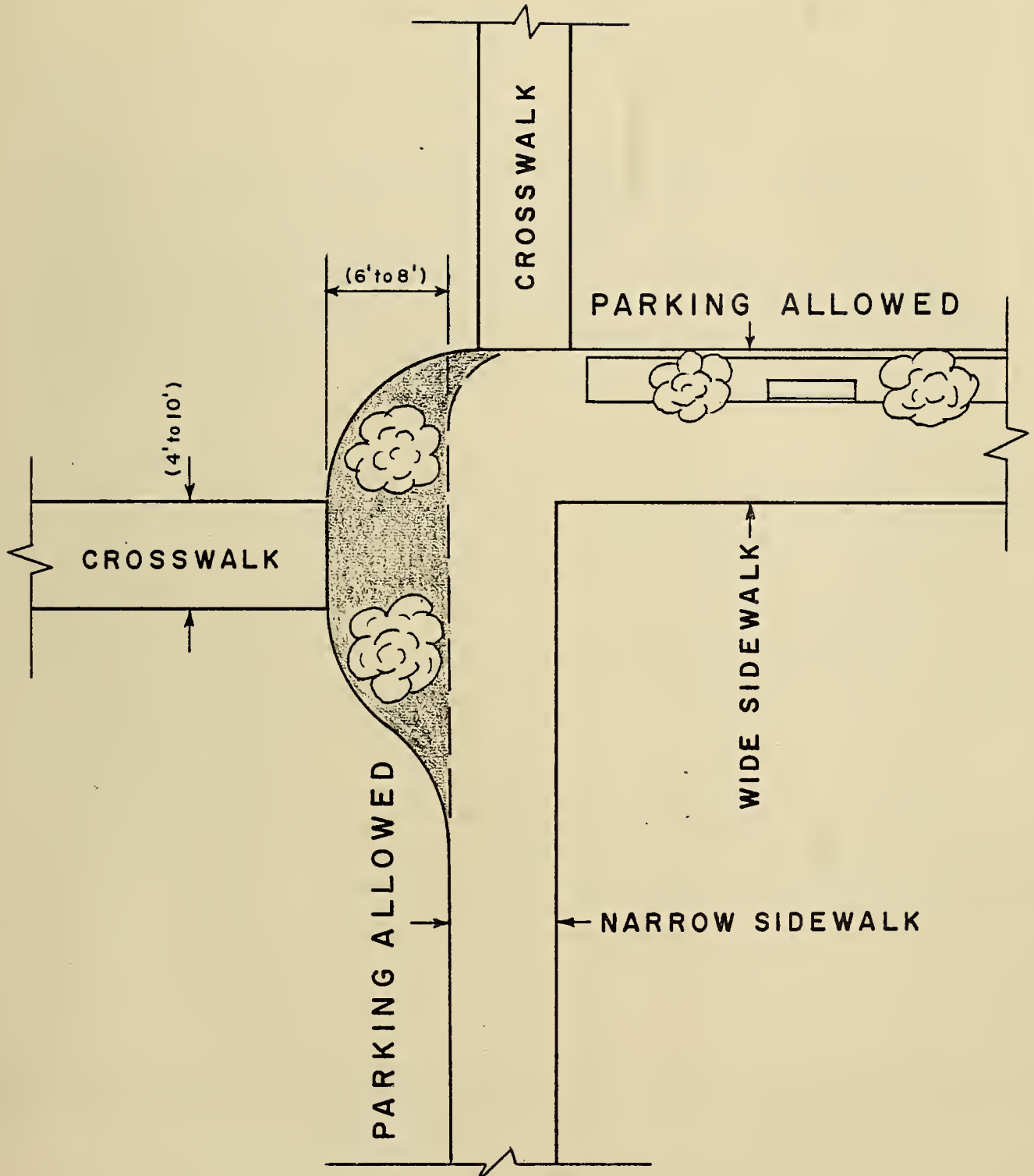
A neckdown is a sidewalk widening into a roadway to the edge of the parking lane, usually at an intersection (Figure 1). This feature is neither absolutely essential to the functioning of the sidewalk nor the roadway, but can offer a number of benefits to both, depending on conditions.

Neckdowns represent a controversial new design element backed up by only a relatively small body of application experience. So recent are they that manuals on street design and roadway geometrics are silent on the subject. The rationale for using neckdowns has been to clear curb corners of parked vehicles, to compensate for narrow sidewalks, to provide opportunity for the placement of trees, benches and other amenities that would otherwise not be possible due to narrow sidewalks and to achieve a perceptual narrowing effect of the street.

In Boston, neckdowns have been constructed in recent years primarily on local residential streets in urban renewal areas and a few other isolated projects. They are being proposed on a number of pending street reconstruction improvements on major streets, where neckdowns are being questioned, chiefly as "capacity restricting devices."

Today, due to increased awareness of the negative environmental and energy impacts of traffic, it is city policy to stabilize and if possible reduce daily automotive travel in the city with mass transportation being the preferred mode. This has further encouraged and made realistic the reduction of excess pavement in favor of wider sidewalks, since ever-increasing traffic can no longer be tolerated.

This report sets forth the pros and cons of neckdowns and conditions for their use. In sum, it seems clear that neckdowns have a role in street design according to specific circumstances, and are neither the evil portrayed by opponents nor an element that should be universally adopted.



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

TYPICAL NECKDOWN

FIGURE 1

CONDITIONS FOR USE

Where Neckdowns are Desirable

Neckdowns present an array of impacts in terms of pedestrian service, parking control, street appearance and traffic operations. When first used in Boston urban renewal projects, the chief features sought were additional sidewalk area where only narrow sidewalks existed and a means to discourage parking at intersection corners. A listing of these and other attributes will help explain the appeal of neckdowns at a time when street designers attempt to give as much emphasis to environmental concerns as to the strict servicing of moving vehicles.

1. A neckdown provides additional sidewalk area. This is crucial in areas where sidewalks are very narrow and existing development prohibits widening. The additional area not only gives space for pedestrians, but permits the inclusion of plantings, benches or other amenities where not otherwise possible. Intersectional neckdowns provide area at crosswalks where waiting requirements and crossing pedestrian flows require more space. Thus, although of greater use with narrow sidewalks, say less than 10 feet, neckdowns at intersections provide extra space where it is more intensively used, regardless of basic sidewalk width.
2. Parking control. Neckdowns "shadow" the parking lane and formally indicate where parking is permitted. In areas of very high parking demand, vehicles often park too near to the corner, in the crosswalk and even on the curb circle, despite enforcement. A neckdown at an intersection tends to discourage such parking. The neckdown itself is shaped to accommodate the paths of turning vehicles and should generally be short enough so as not to appear as a parking space.

3. Neckdowns at crosswalks reduce the roadway walking distance, providing in effect a pedestrian platform at the edge of the line of parked cars. On wide roadways, neckdowns can be an important factor in cutting down both the actual and perceived crosswalk distances.

4. Perceptual narrowing of a local street. A number of measures are being employed to discourage the use of local streets by through-traffic. It is felt that neckdowns at the entrance to a local street, particularly accompanied by planting, make the street appear narrower and less conducive to extraneous traffic.

Where Neckdowns Should be Avoided

Neckdowns are clearly associated with well-used parking or curb service lanes. If a street, due to adjacent land use or traffic reasons, has a very low or sporadic parking demand, or is realistically cleared of parking during periods of the day, neckdowns are not a workable feature. They become a potential hazard due to the obstruction effect when not framing parked cars, and add unnecessarily to maintenance effort. In this regard, although the tasks of snow plowing, drainage and street cleaning can be accomplished with neckdowns, they are in general less convenient than with a straight curb situation. Neckdowns not associated with intensive parking lose their rationale in a number of respects.

Apart from the desired formalization of parking requirements, neckdowns become inappropriate for a number of circumstances, as follows:

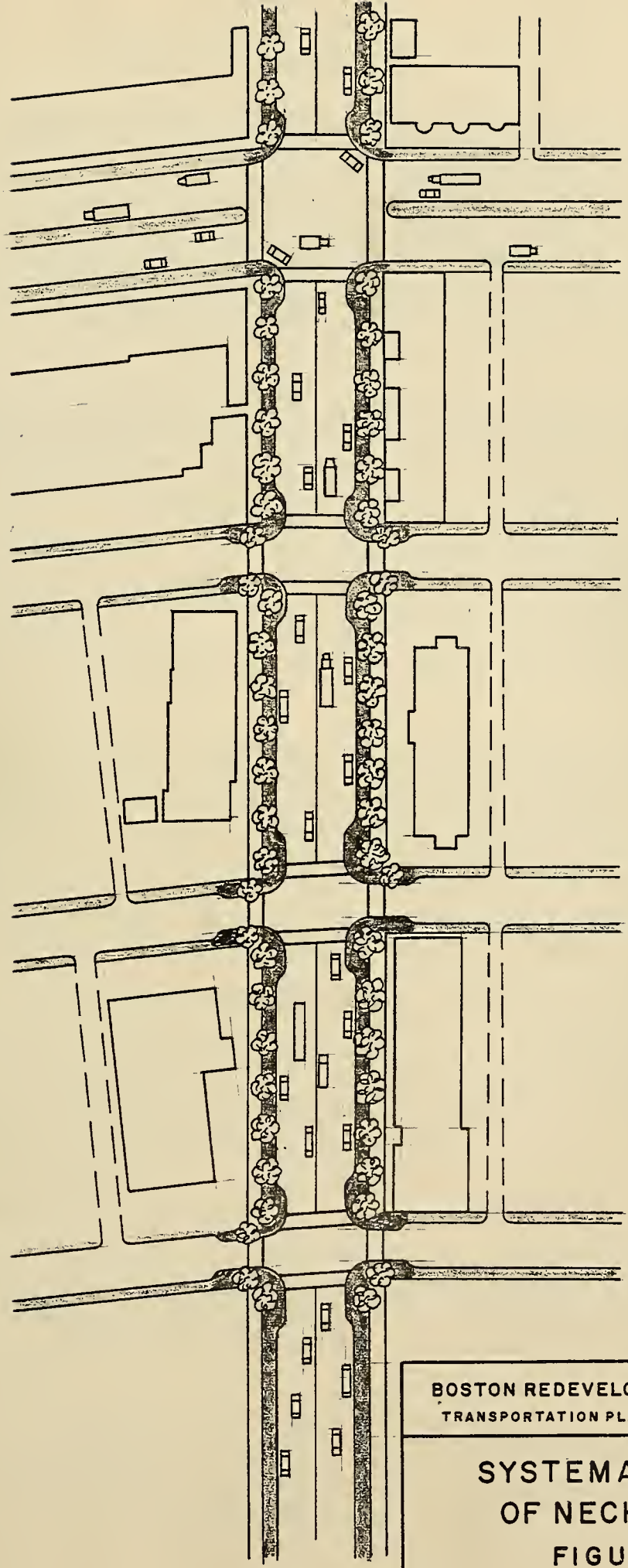
1. Street capacity needs. Neckdowns decrease the width of a roadway at the most critical capacity location, namely at intersections. This lessens the potential capacity by almost one lane. However, if the anticipated future volumes are reasonably handled within the neckdown restrictions, it makes little sense to oppose neckdowns because of capacity gains that are not required.

   If legitimate peak hour capacity requires the curb lane to be cleared in the peak hours, neckdowns should not be employed. A realistic approach must be adopted in this circumstance if the intensity of parking or loading demand of the adjacent land use, coupled with enforcement problems, never result in a usable moving curb lane. This clearly relates to the severity of the capacity needs. As a general rule, if the volume to be served is well documented, neckdowns should be eliminated, since once installed, a difficult management problem becomes physically impossible.

2. If exclusive curbside bus lanes are planned (either with traffic or counter flow) or found to be highly desirable in the future, neckdowns should be omitted. The possible exception could be the situation where enough roadway width exists for all demands - parking, general traffic and exclusive bus - but even here the parking can interfere with bus operations, particularly with counter flow.

3. If neckdowns cannot be shaped to accommodate the turning movements of trucks and buses on a street, they should not be included. This is most often related to the width of streets and whether one-way or two-way operation. One important point here is that if a neckdown does not worsen a poor turning situation (that will not be eliminated through required widening) and helps to eliminate corner parking, it should be acceptable under this criterion.

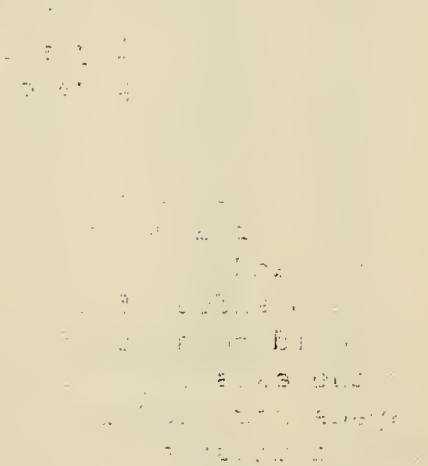
4. From a systematic point of view, neckdowns should not be installed in isolated circumstances, but should be consistent along a length of street or in an area (Figure 2). A spotty, uncoordinated and "unexpected" presence of a neckdown should be severely questioned.



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

SYSTEMATIC USE OF NECKDOWNS

FIGURE 2



NECKDOWN APPLICATIONS

The use of neckdowns largely depends on specific street activities rather than on general street classifications. For instance whether a street is classified as being local or major, neckdowns would only be a consideration in street design if on-street parking were allowed and needed roadway capacity was not at stake. Obviously as a generality the inclusion of neckdowns on an arterial would be less likely than on a collector or local street but the decision should be based upon the particulars of each case.

When conditions for use as set forth previously are broadly met, a detailed analysis must be done to see if neckdowns can be functionally and spacially accommodated. Certain minimum dimensions of street elements must be observed. These include a minimum of 11' travel lanes, 8' parking lanes and 7' sidewalks. Even though, as mentioned previously, a 10' sidewalk is the most preferred minimum, in the City of Boston past experience has revealed that due to historical trends in this city's street development, 7' is more practical with the goal of providing a 10' minimum wherever possible. This determines minimum space conditions needed in the street right-of-way.

For instance if a one-way street were considered and parking on both sides were allowed, a minimum roadway width of 27' must exist. If only 20' exists then parking, and therefore neckdowns, must only be considered for one and not two sides of the street. In this case most likely the final design would consist of a 12' travel lane and an 8' parking lane, assuming the existing sidewalk is adequate. In any given case the minimum space required for the desired elements must be determined and weighed against available width.

After fixing certain key dimensions it is possible to explore neckdowns in a number of particular applications. Presented below are several typical applications of neckdowns at intersections, bus stop locations and midblock pedestrian crossings. The examples discussed are the most frequently encountered and can be adapted to most instances where neckdown designs arise.

A. Intersectional Use

Once the right-of-way dimensions indicate that neckdowns can be accommodated without compromising the necessary roadway capacity, specific neckdown layout can be accomplished. For the usual intersection application, the following must be taken into account.

1. Are the neckdowns applicable to both the main street and the side street? If parking cannot be permited (at all times) on any curb face, a sidewalk widening is not appropriate into the related roadway. Thus we may have a number of different neckdown configurations depending on circumstances.

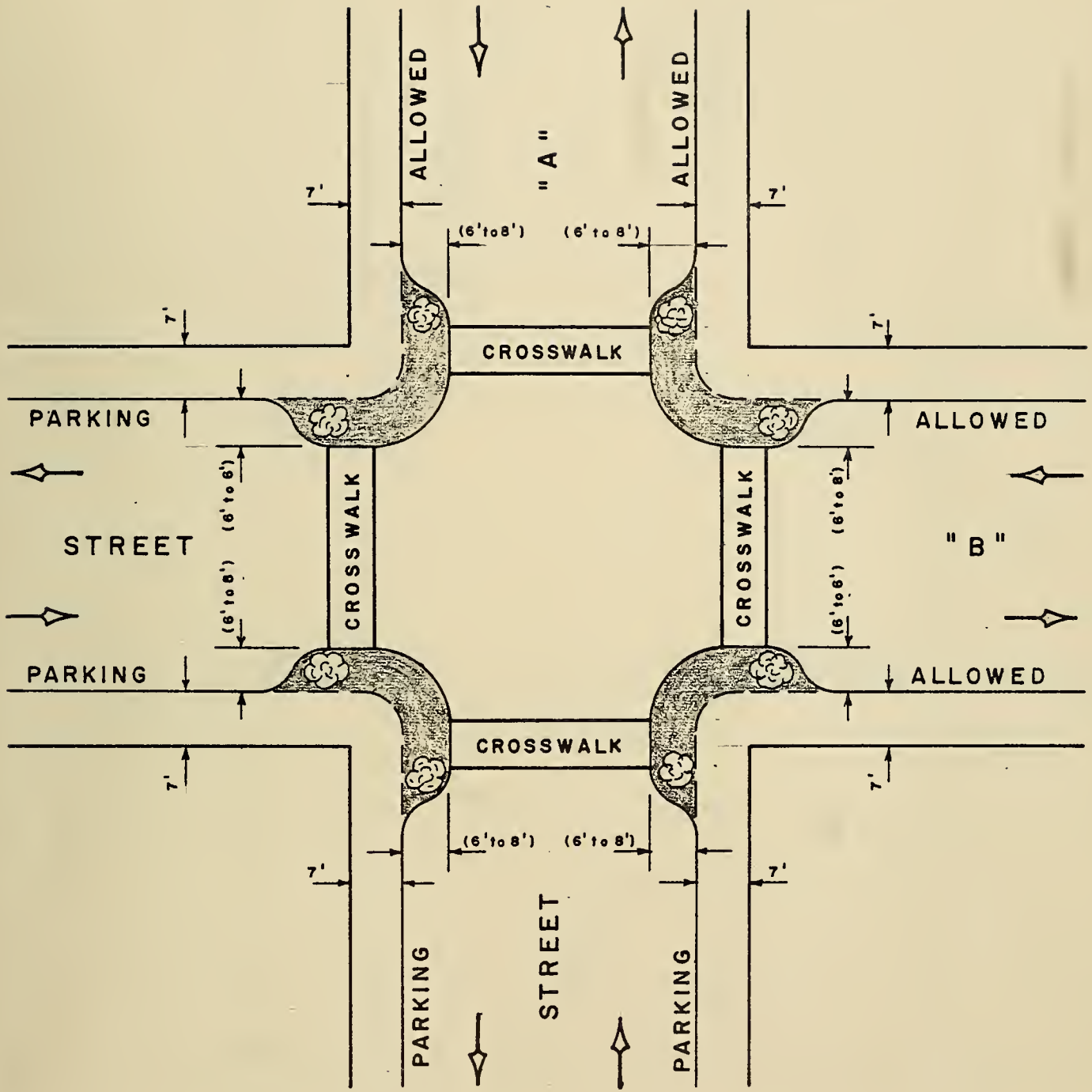
Figure 3 shows a typical neckdown situation on all corners and into all roadways. For illustrative purposes both intersecting streets are shown as two-way, two moving lanes with parking allowed on all sides. Minimum street dimensions for this type of configuration would be 38' (2-11' lanes, 2-8' parking lanes) from curb to curb. Assuming a 7' sidewalk already exists roadway dimensions with 8' neckdowns would reduce to 22' between neckdowns. However, there are situations where due to severe impact upon turning movements 6' neckdowns are used. In this circumstance the effective roadway width would still only be 22', since approximately a 2' overlap between the 6' neckdown and parked vehicle would exist.

Figure 4 shows a typical situation where neckdowns are only appropriate on the side streets and the main street curb is kept straight. In this case the total main street roadway width is retained for capacity or exclusive bus lane purposes.

2. Can turning movements be served satisfactorily? Neckdowns should be shaped to allow vehicles to turn without conflict. The largest vehicle provided for depends upon street usage, but in practice the single unit design truck (as established by the American Association of State Highway and Transportation Officials) is adequate for many urban situations. More liberal layouts are necessary on routes where very large trucks are regularly encountered. The safe and convenient access of emergency vehicles, buses, service trucks, etc. must be allowed.

   The detailing of neckdown shape for turning allowances is accomplished by using templates of the path of the largest vehicle being served. The shape can also vary according to whether any intersecting street is one-way and according to roadway widths. If possible, turns should be laid out from and to the required lanes, without encroachment into adjacent lanes, particularly if the lane serves opposing traffic.

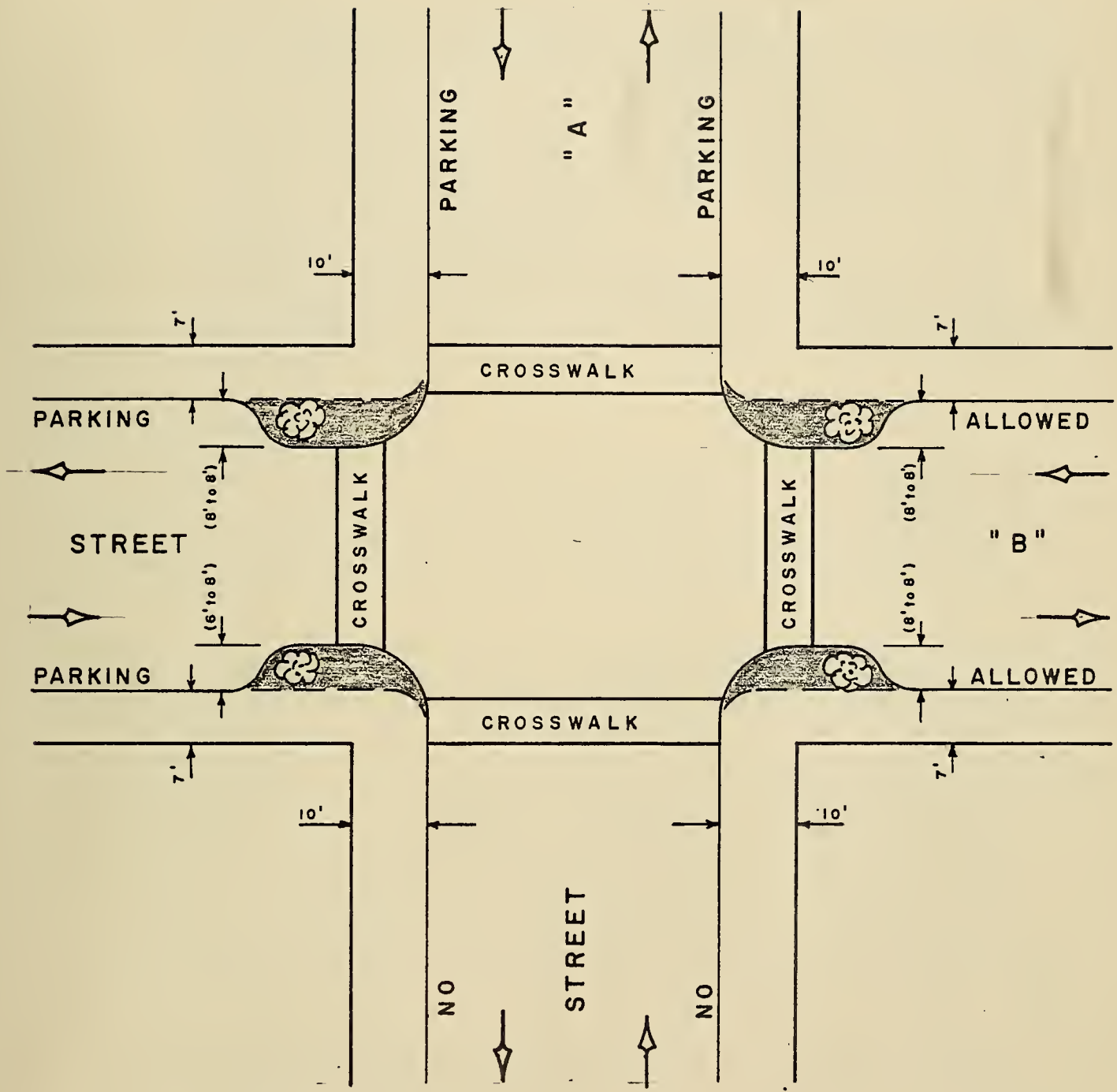
3. Crosswalks and neckdowns should correspond very closely. It makes little sense to design an intersectional neckdown which provides additional pedestrian refuge and waiting area if it is not reasonably in the line of natural pedestrian travel.



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS ON BOTH STREETS

FIGURE 3



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS
ONLY ON SIDE STREET
FIGURE 4

4. Is the length of the neckdown correct? If intersectional neckdowns are to accomplish the purpose of discouraging corner parking, experience indicates that they should not appear long enough to accommodate a parked car. To this end, the straight portion of a neckdown should not exceed about 10 feet with a 4'-6' distance being the most desirable. This may be violated in the interest of extending a neckdown at a bus stop to serve as a defined waiting platform, as set forth later.

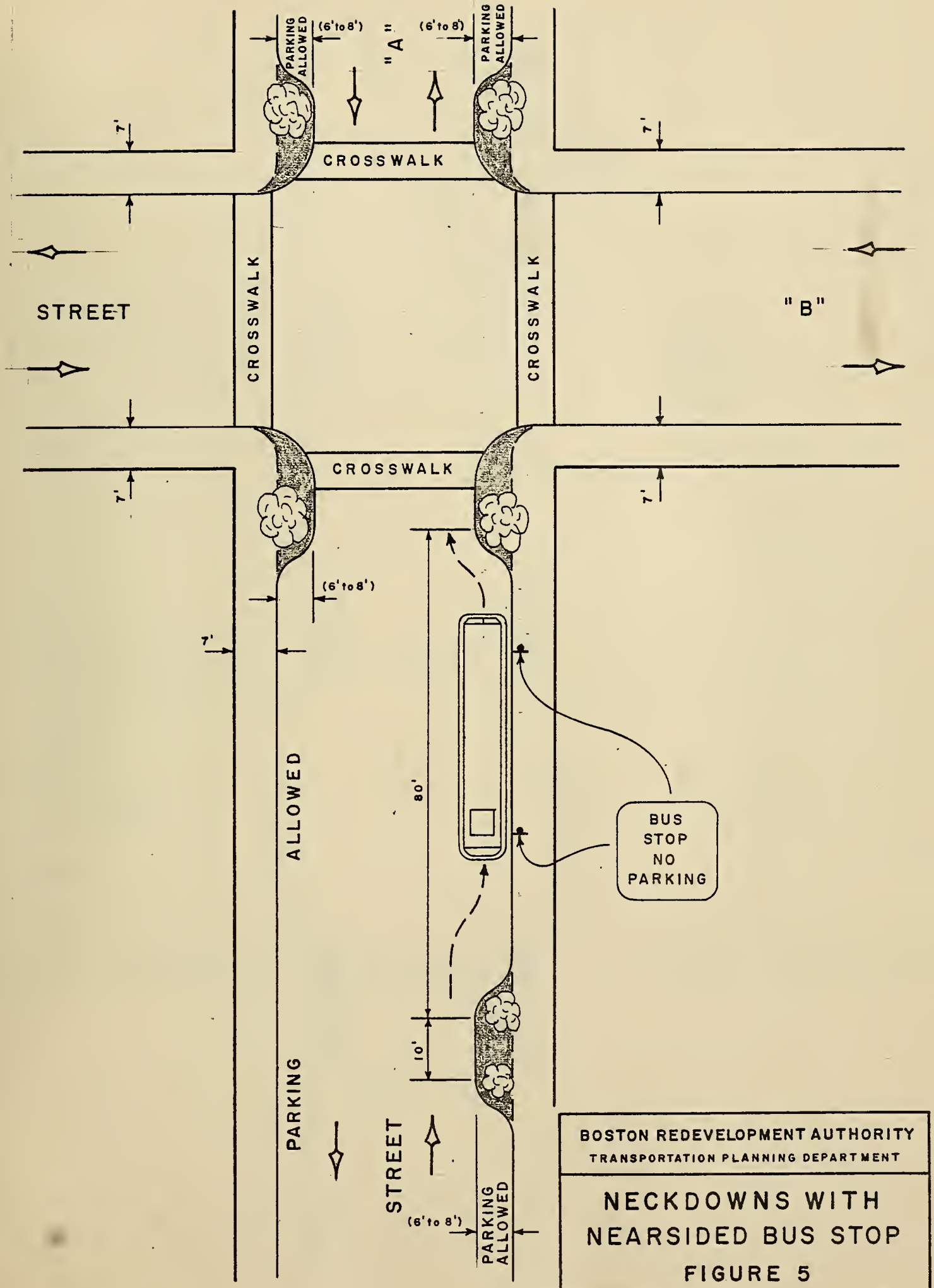
   It has been suggested that parking on neckdowns may be discouraged by locating hydrants there. A further facetious suggestion would install "dummy" hydrants for the same purpose.

B. Bus Stops

Neckdown design at bus stops is similar to the approach discussed above, except that an auxilary sidewalk widening may be used to define the stop against the regular sidewalk, or the neckdown may have to be lengthened for stopping at the neckdown.

Assuming the stop is along the curb when neckdowns and bus stops are both placed at the near side of an intersection, the bus must maneuver around the neckdown into the travel lane in order to enter the intersection (Figure 5). Such movements are quite difficult and would probably result in the operator not pulling out of the travel lane to pick up or discharge riders. However, if neckdowns and bus stops are placed at the far side of the intersection (Figure 6) quick access into the stop area can be provided with minimum disruption to traffic flow. This would occur because by having the stop and neckdown at the far side of the intersection a bus would be able to exit from the stop at his own will rather than run the risk of being delayed by a change of signal light.

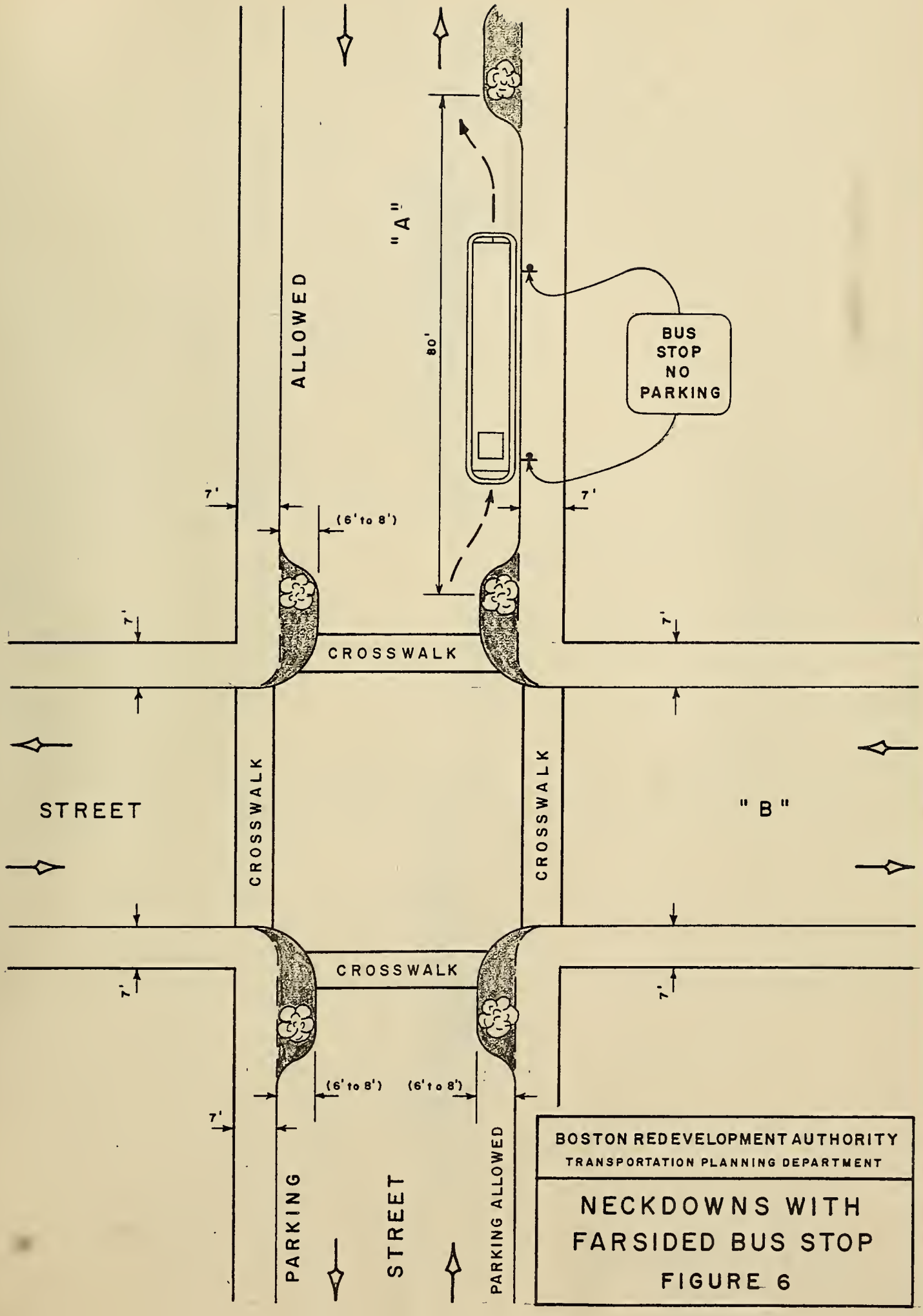
A third possibility in bus stop design is to have the stop occur along the neckdown (Figure 7). Here whether near-sided or far-sided the bus would not require any maneuvering since it would stop in the travel lane. However, since a bus when stopped would prevent traffic flow from occuring along that lane it would be more desirable to place the stop on the far side of the intersection since this would help minimize its effect on other vehicle movement when a green



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS WITH NEARSIDED BUS STOP

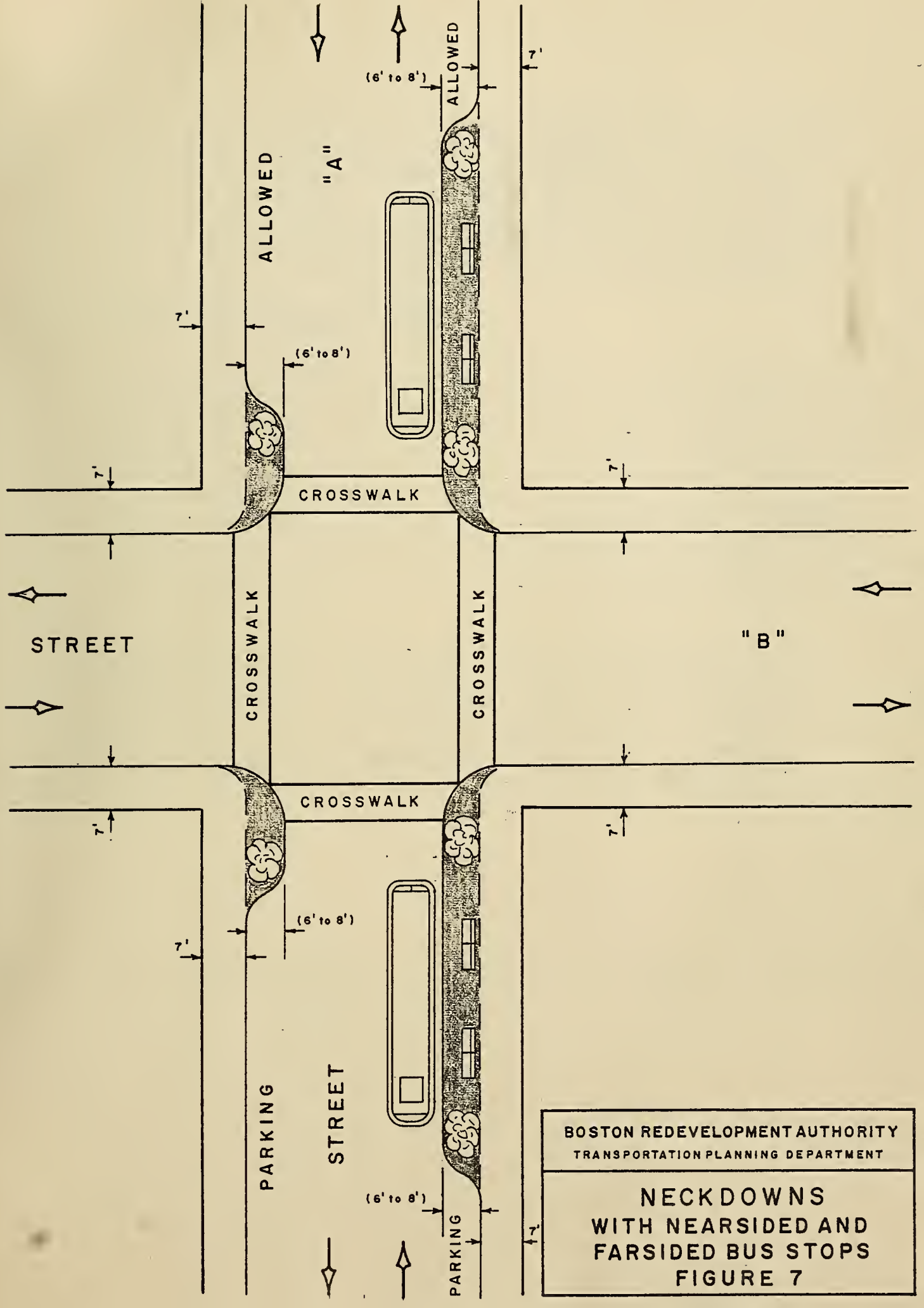
FIGURE 5



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS WITH FARSIDED BUS STOP

FIGURE 6



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS WITH NEARSIDED AND FARSIDED BUS STOPS

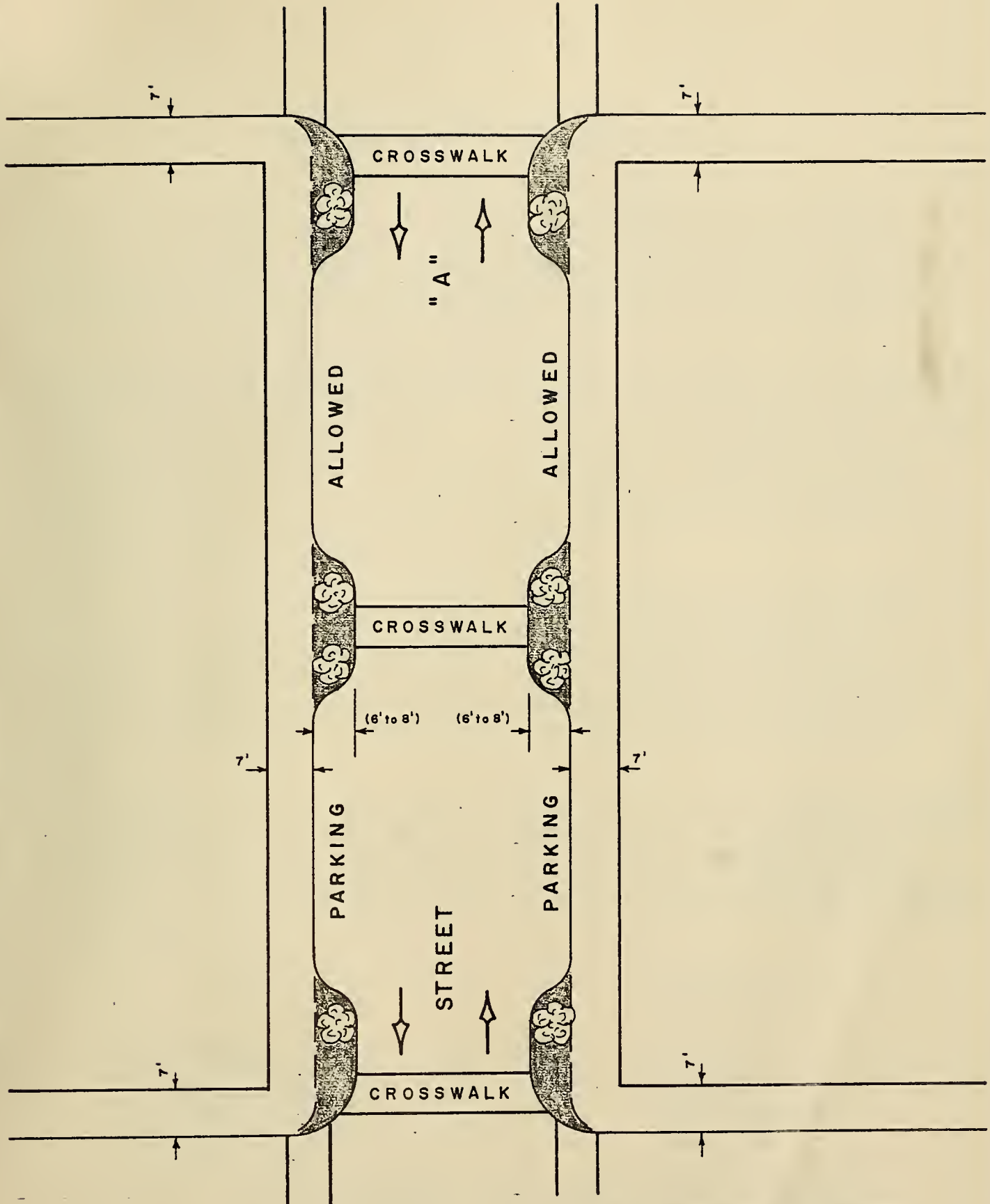
FIGURE 7

light exists. In any event, the capacity disruption caused by typical bus service should on the average be under 10%, assuming 3 minute headways and 20 second stops, half of the time on a red signal. Even though this type of bus stop configuration facilitates bus operation the required length for the neckdown encourages parking within the bus stop area and therefore also creates more of an enforcement problem.

C. Midblock Pedestrian Crossing

A third area that must be viewed when discussing neckdowns is midblock pedestrian crossings. Quite often due to the excessive walking distance between intersections pedestrians tend to avoid intersectional crossings in favor of midblock crossings. This creates a need for increased sidewalk at midblock. If the sidewalk is relatively narrow the construction of a neckdown, as illustrated in Figure 8, can provide additional pedestrian storage area and with crosswalk markings can help better define the crossing location. It also tends to discourage parking on the crosswalk.

In summary, neckdown applications must be tailor-made to suit circumstances, taking into account the curb lane conditions on all streets involved, street element widths, vehicle turning patterns, pedestrian demands and bus requirements. It is assumed that the matters of street drainage and crossectional grades are treated according to long-established standards.



BOSTON REDEVELOPMENT AUTHORITY
TRANSPORTATION PLANNING DEPARTMENT

NECKDOWNS AT MIDBLOCK

FIGURE 8

BOSTON'S NECKDOWN PROGRAM

As mentioned previously, the desire for neckdowns is not determined by the type of street (i.e. local, arterial) but rather by its relationship to abutting developments and pedestrian activity. In Boston there are many areas where neckdowns have been installed and proven to be effective and well-received by the community.

As part of the City's urban renewal efforts, neckdowns have been constructed in the predominately residential communities of Charlestown, South End and South Cove. In each of these communities, off-street parking facilities are limited, parking demand is high and in many cases sidewalks are barely adequate to accommodate pedestrian movement. In these areas the neckdowns serve to control the parking at corners and provide additional sidewalk area for the various reasons previously set forth.

More recently neckdowns have been used in the Waterfront section of the City along Atlantic Avenue and along Washington Street in the CBD. While on Atlantic Avenue they were used primarily to delineate legal on-street parking spaces and provide for the placement of trees along the sidewalks, they were used on Washington Street to also provide additional sidewalk to enhance a mall concept.

At present, most of the City's street reconstruction program proposes neckdowns in all cases where street capacity is not a serious consideration and other criteria (desire for wider sidewalk, trees, benches, etc.) for neckdown design exists. Street improvement proposals throughout the City now being prepared which include neckdowns are as follows.

Project		Community
1) Tremont Street	-	South End
2) Blue Hill Avenue	-	Roxbury
3) Columbia Road	-	Dorchester
4) Centre Street	-	West Roxbury
5) Stuart Street	-	Park Plaza

All in all, the City of Boston views neckdowns as a desirable feature for urban streets when specific criteria and needs exist. The creative use of neckdowns, subject to the restraints discussed, represents a desire to allow available street space equitably among various needs - pedestrian, environmental, traffic and parking. This hopefully represents "balanced transportation" at the street level.

R97
BRA 1 Boston Redevelopment
Authority